REMARKS

Statement of the Substance of the Interview

Applicants thank the examiner for extending the courtesy of conducting a telephonic interview on March 11. During the interview, applicants argued that "pattern based search" was understood by those of ordinary skill in the art to be a specific kind of search. The examiner countered that the Office was entitled to give the phrase "pattern based search" its broadest reasonable interpretation. No agreement was reached, although the examiner did indicate that incorporating a definition from the specification into the claims, or otherwise tying the language of the claims to a definition in the specification, might be a way in which the Office would be forced to limit its broadest reasonable interpretation of the language of the claims.

Claims 1 and 23

In the Office action, bottom of page 6 and top of page 7, consistent with the position the examiner took during the interview, the examiner states:

> A pattern base[d] search can be broadly interpreted to be the development of relationships between X, Y, and Z . . . a pattern based search is a relationship process among pattern X, pattern y and pattern z.

Claims 1 and 23 have been amended to specifically recite:

> performing a search on a computer using sets of moves to explore possible configurations of objects within a space

Support for that amendment can be found in paragraph [0017] of the published application which provides:

> [0017] Many different stochastic search algorithms have been applied to the 3D layout problem. These include genetic algorithms, simulated annealing and extended pattern search (EPS). Extended pattern search is basically pattern search with extensions to make it stochastic. Pattern search uses move sets (patterns) to explore the search space. In 3D component layout, these moves are typically translations and rotations of the components. (emphasis added)

See also:

> [0083] Example 1: Packing three big cubes, three small cubes, three rods, three plates, three gears, and three small spheres into a

large sphere.

[0084] Example 2: Packing standard (SAE) luggage pieces into the trunk of a car.

[0085] Example 3: Eighteen gears packed into a cubic container. The container is sized such that the gears can all fit into the container only if their teeth intermesh.

Claims 1 and 23 go on to recite just how the search is performed:

> said search performed by successively generating a plurality of new object ~~component~~ configurations within said space by applying a plurality of object moves and evaluating a design objective ~~an objective function~~ at each of said plurality of new configurations until a final configuration is selected and output, and wherein a criterion other than the size of the move is used to determine the order in which the objects are moved within said space ~~moves are applied~~.

The currently amended claims contain a description of how the search is performed and clearly define how applicants' search is different from pattern searches known in the art and discussed in the background of the specification. It is believed the current amendment clearly places the primary reference(U.S. patent no. 6,636,862 to Lundahl) relied upon by the examiner wide of the mark.

Lundahl is directed to a method and system for the dynamic analysis of data represented in distinct matrices. The Abstract of Lundahl provides as follows:

> In a method and system for the dynamic analysis of data represented in distinct matrices, if two data matrices X and Y are present in which corresponding rows of X and Y each refer to the same underlying object, a relationship can [be] developed between the X and Y data matrices, which allows for a prediction of responses in Y on the basis of inputted X-data. And, if a third data matrix Z is present in which corresponding columns of Y and row of Z each refer to the same underlying object, a relationship can developed between the X Y and Z data matrices, which allows for link between X and Z through Y.

This passage of Lundahl cannot be interpreted to read on the language of amended claims 1 and 23 as there is no use of sets of moves to explore possible configurations of objects within a space, no successively generating a plurality of new object configurations within the space by applying a plurality of object moves, no evaluating a design objective at each of the

plurality of new configurations until a final configuration is selected and output, and no indication that a criterion other than the size of the move is used to determine the order in which the objects are moved within the space because there are no objects being moved. See also the Second Declaration of Dr. Aladahalli, paragraphs 8 and 9.

Lundahl, at column 15, lines 35 – 43, discloses:

> In the first subroutine, a process that similar to that of a Kohonen Self-Organizing Map ("SOM") is used, and the data order is fixed by sorting by "density" as with a density trace (which is described in further detail below) and then presented to a "network" one data point at a time. For further explanation of Kohonen Self-Organizing Maps, see T. Kohonen, "Self-organized formation of topologically correct feature maps," 43 Biol. Cybern., pps. 59-69 (1982), an article which is incorporated herein by this reference.

This portion of Lundahl, on its face, describes sorting data by density. This passage of Lundahl cannot be interpreted to read on the language of amended claims 1 and 23 as there is no use of sets of moves to explore possible configurations of objects within a space, no successively generating a plurality of new object configurations within the space by applying a plurality of object moves, no evaluating a design objective at each of the plurality of new configurations until a final configuration is selected and output, and no indication that a criterion other than the size of the move is used to determine the order in which the objects are moved within the space because there are no objects being moved in Lundahl.

Claims 2 and 24

The "move" that is referred to in claims 2 and 24 is the object move introduced in claims 1 and 23. Because the cited portion of Lundahl cannot be interpreted to read on move sets to explore possible configurations of objects within a space, the cited portion of Lundahl does not disclose or suggest determining which moves have the greatest effect on the design objective and applying those moves before applying moves having a lesser effect on the design objective. Claims 2 and 24 are believed to be in condition for allowance.

Claims 4 and 26

The examiner cites Lundahl, column 38, lines 19-54, and states that "component moves are those characteristics that make up the objective function." This is purely a hindsight reading of Lundahl which provides in column 38, lines 19-54, as follows:

> Optimization typically refers to function minimization or maximization, specifically, what value(s) of the function domain gives the global (as opposed to local) maximum or minimum of the function. The function to be minimized/maximized is referred to as the objective function. In some cases, the optimization solution can be calculated analytically. Often, however, this is not the case. Therefore, search routines have been developed that attempt to find an optimum. Performance of these routines for a given objective function varies in both time and accuracy. In the current context, it is assumed that optimization refers to function minimization, in that that the objective is to maximize f: $XZ \rightarrow Y_{col}$. Since the objective function is -f, maximizing f is equivalent to minimizing -f.
>
> In the preferred embodiment of the present invention described herein, an optimization routine called SIMPS is employed. This optimization routine was developed by Zeljko Bajzer and Ivo Penzar of the Mayo Clinic and Foundation, Rochester, Minn., USA; SIMPS is available on the Internet through the MathWorks.TM. web site at http://www.mathworks.com. Similar to other such optimization routines, SIMPS requires inputs of the objective function; a starting point, x_0, from which to begin searching for the minimum; and the variable constraints, i.e., the lower and upper bounds of the domain variables. In addition, SIMPS allows for the option of holding specified variables fixed during the search routine, which is useful in finding an optimal $z \varepsilon \partial_z$ given $z \varepsilon \partial_x$, or an optimal $z \varepsilon \partial_x$. For example, to $z \varepsilon \partial_z$. given $z \varepsilon \partial_x$, it can be specified that the x variables in the mapping f:x,z→y are held fixed. This effectively creates a new function, f_x, such that f_x :z→y with corresponding objective function $-f_x$. The search routine is then conducted solely over the z domain (defined by the constraints) to try to minimize $-f_x$.

There is nothing in the plain language of this section that even remotely mentions object moves.

The examiner next cites to Lundahl, column 15, lines 35-43, quoted above, as disclosing that density is equivalent to sensitivity. Again, that is a purely hindsight reading. There is no indication within the four corners of the citation that density is the equivalent of sensitivity. The examiner cites Lundahl, column 15, lines 35-43, as disclosing the "selecting a sensitivity group." The cited language, on its face, speaks of sorting and presenting the data by density, not selecting a density group. The examiner cites the same portion of Lundahl as disclosing "picking one

move from said set of moves in said selected sensitivity group and applying said move to a saved configuration of components." There is nothing in the cited portion of Lundahl that can be read as component or object moves and, therefore, nothing in the cited portion that can be construed to mean "picking one move from said set of moves in said selected sensitivity group and applying said move to a saved configuration of objects within a space." The "network" is certainly not a saved configuration of objects as asserted by the examiner.

The examiner next cites Lundahl, column 15, lines 44-55, which provide as follows:

> As with a Kohonen network, the sample point (weight) closest to the presented data point "wins" and is chosen to be updated using the same formula as the Kohonen SOM. For every update, the index is calculated. If the index increases, the updated weight remains, and the same data point is again presented to the network. If the index decreases or remains the same, the update is negated, and the next data point from the ordered data list is presented. Each weight, w, has an associated learning parameter, α_w. If a neuron weight has not been updated after being presented all or most of the data points in its neighborhood, its learning parameter is reduced according to the formula:

This portion of Lundahl speaks of presenting a sample point, and continuing to present the same sample point until an index decreases or remains the same, in which case the next data point from the ordered data list is presented. The presentation of data points for evaluation in no way discloses the presentation of a new configuration of objects in a configuration problem. The examiner's entire reading of Lundahl as applied to claims 4 and 26 stretches the "broadest reasonable interpretation" requirement to unsupportable limits. It is believed that claims 4 and 26 are not anticipated by Lundahl. Accordingly, the rejection of claims 4 and 26 should be withdrawn.

Claims 5, 27

The examiner cites Lundahl, column 32, lines 5-22, as anticipating claims 5 and 27. The cited portion of Lundahl provides as follows:

> Finally, as indicated by OUTPUT 2040 of FIG. 10, various outputs are achieved. First, the calibration process outputs a vector, x_pred_{rank}, that is used for ranking the X-prediction variables in importance from the $Y=[G\ X]_{PLS}$ model. If B is the coefficient matrix for the latter model, then B(i,:) is the row of B

> corresponding to the ith X variable used in the modeling. The "score" given to this variable is the sum of the absolute value of the elements of B(i,:). Secondly, the calibration process outputs another vector, $x\_descrim_{rank}$, that is used for ranking the X-classification variables for their so-called discriminatory power from the alternate discriminatory power method. Third and finally, the calibration process outputs the estimated condition number of the variance-covariance type matrix, X_{OLS} ' X_{OLS}, for the $Y=[G\ X]_{OLS}$ model, along with an associated indicator, no_{OLS}. If $no_{OLS}=1$, the estimated condition number is greater than five hundred; otherwise, $no_{OLS}=0$. (emphases added)

Recall that the "moves" mentioned in claims 5 and 27 are "object moves." There is nothing in the cited portion of Lundahl that anticipates "ranking each of said plurality of moves based on an amount of change each move is expected to have on an objective function incorporating said design objective and wherein said organizing includes ordering said moves from the highest to lowest ranking.

Claims 6, 12, 17, 22, 28, 34, 39, 44

The examiner cites the same portion of Lundahl, column 32, lines 5-22, as anticipating each of these claims. It is respectfully submitted that the ranking that is recited in the claims is the ranking of object moves. The cited portions of Lundahl do not disclose any type of ranking of object moves.

Claims 7, 13, 18, 29, 35, 40

It is again respectfully submitted that the "moves" that are cited in these claims are "object moves." Lundahl does not disclose object moves and therefore cannot anticipate these claims.

Claims 8, 14, 19, 30, 36, 41

No arguments are provided at this time with respect to the patentability of these dependent claims inasmuch as the claims from which these claims depend are believed to be in condition for allowance. The failure to submit arguments in favor of the patentability of these dependent claims should not be construed as an acquiescence in the Office's position.

Claims 9, 31

The examiner states that Lundahl anticipates determining the effect because "moves are synonymous with changes to the objective function." The examiner cites Lundahl, column 38, lines 19-32. There is nothing in the cited portion of Lundahl which discloses or suggests deriving a function that "quantifies the effect each move has on the change in an objective function." Claims 9 and 31 are believed to be in condition for allowance.

Claims 10, 15, 20, 32, 37, 42

The examiner cites Lundahl, column 2, lines 36-55, which provide as follows:

> The present invention is a method and system for the dynamic analysis of data that is comprised of a series of computational steps achieved through the use of a digital computer program. Specifically, there are three phases of the preferred dynamic data analysis. In the first phase, a cluster analysis or clustering sequence is performed on a data matrix Y in order to segment the data into appropriate clusters for subsequent computational analysis. The second phase is a modeling phase. If a second data matrix X is present such that corresponding rows of X and Y each refer to the same underlying object, in the second phase, a relationship can developed between the X and Y data matrices, which allows the method and system of the present invention to predict responses in Y on the basis of inputted X-data. The third phase is also a modeling phase. If a third data matrix Z is present in which corresponding columns of Y and row of Z each refer to the same underlying object, a relationship can developed between the X Y and Z data matrices, which allows the method and system of the present invention to link X with Z through Y..

As seen from the foregoing quote, the examiner, under the guise of "broadest reasonable interpretation" contorts the language through the use of hindsight to somehow read clustering as determining the non-intersecting volume between an object and itself after applying a move. It is respectfully submitted that whether data fits into a cluster or not in no way anticipates determining the non-intersecting volume between an object and itself after applying a move. Claims 10, 15, 20, 32, 37, and 42 are believed to be in condition for allowance.

Claims 11, 16, 33, 38

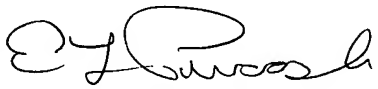
The examiner cites Lundahl, column 9, lines 28-44, and column 38, lines 34-44, as teaching a calibration process. The examiner is apparently of the belief that claims 11, 16, 33, and 38 are nothing more than a calibration process such that the citation of any type of calibration process anticipates these claims. Claims 11, 16, 33, and 38 are specific in that they recite ranking each of the plurality of moves on a set of objects within a space based on the effect each move is expected to have on a design objective, and storing the ranking for use in ordering the moves within a computer program for performing a search in which sets of moves are used to generate a plurality of object configurations within a space, and wherein the moves are applied from those moves having the highest ranking to those moves having the lowest ranking. While the recited language might be viewed as some type of preprocessing activity, it is quite a stretch to call the language of the claims a calibration process, and more of a stretch to find within the language of Lundahl any indication that Lundahl is ranking the effect of object moves on a set of objects within a space. Absent hindsight, no reasonable construction of the language of claims 11, 16, 33, and 38 renders Lundahl an anticipatory reference. Claims 11, 16, 33, and 38 are believed to be in condition for allowance.

Applicants have made a diligent effort to place the instant application in condition for allowance. An RCE has previously been filed in this case in which the applicants took advantage of the examiner's suggestion to substantially amend the claims. In response to the examiner interview, the claims have again been substantially amended. It is believed that the amended claims clearly distinguish over the Lundahl reference and are thus patentable over the art of record.

During the search of the corresponding PCT application, a reference referred to as the "Bennett schedule" was cited. It is believed that the earliest publication date of the Bennett schedule is within the one-year grace period and is therefore not prior art under 35 U.S.C. § 102(b). Furthermore, the Bennett schedule is not prior art under 35 U.S.C. § 102(a) because the Bennett schedule is not work by another. See the enclosed Declaration Under Rule 132.

Applicants have at all times made a diligent effort to place the instant application in condition for allowance. Accordingly, a Notice of Allowance for all currently pending claims is respectfully requested.

Respectfully submitted,



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